

**IN THE CLAIMS****Complete listing of the claims:**

1. (Currently amended) A method of pattern recognition comprising:  
generating a hologram of a reference object;  
generating a hologram of an input object; and  
correlating the hologram of the reference object with the hologram of the input object to generate a set of correlation peaks;  
wherein the correlating of the hologram of the reference object with the hologram of the input object comprises:  
transforming the hologram of the reference object;  
transforming the hologram of the input object; and  
multiplying the transformation of the hologram of the reference object by the transformation of the hologram of the input object.
2. (Original) The method as set forth in Claim 1 further comprising analyzing the set of correlation peaks generated by the correlation of the hologram of the reference object with the hologram of the input object wherein the presence of a correlation peak indicates similarity between the reference object and the input object and wherein the lack of the presence of a correlation peak indicates dissimilarity between the reference object and the input object.
3. (Original) The method as set forth in Claim 1 further comprising recording the hologram of the reference object.
4. (Original) The method as set forth in Claim 1 further comprising recording the hologram of the input object.
5. (Canceled)
6. (Currently amended) The method as set forth in Claim [[5]] 1 wherein the transforming of the hologram of the reference object comprises Fourier transforming the

hologram of the reference object and wherein transforming the hologram of the input object comprises Fourier transforming the hologram of the input object.

7. (Original) The method as set forth in Claim 6 further comprising transforming the multiplication of the transformation of the hologram of the reference object and the transformation of the hologram of the input object.

8. (Currently amended) A method of pattern recognition comprising:  
generating a hologram of a reference object;  
generating a hologram of an input object;  
defining a window within the hologram of the input object;  
correlating the hologram of the reference object with the window defined within the hologram of the input object to generate a set of correlation peaks;  
wherein the correlating of the hologram of the reference object with the window within the hologram of the input object comprises:  
transforming the hologram of the reference object;  
transforming the window defined within the hologram of the input object; and  
multiplying the transformation of the hologram of the reference object by the transformation of the window defined within the hologram of the input object.

9. (Original) The method as set forth in Claim 8 further comprising analyzing the set of correlation peaks generated by the correlation of the hologram of the reference object with the window defined within the hologram of the input object wherein the presence of a correlation peak indicates similarity between the reference object and the input object and wherein the lack of the presence of a correlation peak indicates dissimilarity between the reference object and the input object.

10. (Original) The method as set forth in Claim 8 further comprising recording the hologram of the reference object.

11. (Original) The method as set forth in Claim 8 further comprising recording the hologram of the input object.

12. (Canceled)

13. (Currently amended) The method as set forth in Claim [[12]] 8 wherein the transforming of the hologram of the reference object comprises Fourier transforming the hologram of the reference object and wherein transforming the window within the hologram of the input object comprises Fourier transforming the window within the hologram of the input object.

14. (Original) The method as set forth in Claim 13 further comprising transforming the multiplication of the transformation of the hologram of the reference object and the transformation of the window defined within the hologram of the input object.

15. (Currently amended) A method of pattern recognition comprising:  
generating a hologram of a reference object;  
generating a hologram of an input object;  
defining a window within the hologram of the input object;  
correlating the hologram of the reference object with the window defined  
within the hologram of the input object to generate a set of correlation peaks;

~~The method as set forth in Claim 8~~ wherein the defining of a window within the hologram of the input object comprises defining a window according to the equation

$$H_p'(m, n; a_x, a_y) = H_p(m, n) \text{rect} \left( \frac{m - a_x}{b_x}, \frac{n - a_y}{b_y} \right),$$

wherein  $H_p'(m, n; a_x, a_y)$  is the defined window,  $\text{rect} \left( \frac{m - a_x}{b_x}, \frac{n - a_y}{b_y} \right)$  is the rectangle function,  $H_p(m, n)$  is the hologram of the reference object,  $a_x$  is the location of the center

of the window in the  $x$  direction,  $a_y$  is the location of the center of the window in the  $y$  direction,  $b_x$  is width of the window in the  $x$  direction, and  $b_y$  is width of the window in the  $y$  direction.

16. (Currently amended) A storage medium encoded with a set of data created by:  
generating a hologram of a reference object;  
generating a hologram of an input object; and  
correlating the hologram of the reference object with the hologram of the input object to generate a set of correlation peaks;

wherein the correlating of the hologram of the reference object with the hologram of the input object comprises:

transforming the hologram of the reference object;  
transforming the hologram of the input object; and  
multiplying the transformation of the hologram of the reference object by the transformation of the hologram of the input object.

17. (Original) The storage medium as set forth in Claim 16 further comprising analyzing the set of correlation peaks generated by the correlation of the hologram of the reference object with the hologram of the input object wherein the presence of a correlation peak indicates similarity between the reference object and the input object and wherein the lack of the presence of a correlation peak indicates dissimilarity between the reference object and the input object.

18. (Original) The storage medium as set forth in Claim 16 wherein the generating of the hologram of the reference object includes recording the hologram of the reference object.

19. (Original) The storage medium as set forth in Claim 16 wherein the generating of the hologram of the input object includes recording the hologram of the input object.

20. (Canceled)

21. (Currently amended) The storage medium as set forth in Claim [[20]] 16 wherein the transforming of the hologram of the reference object comprises Fourier transforming the hologram of the reference object.

22. (Currently amended) The storage medium as set forth in Claim [[20]] 16 wherein the transforming of the hologram of the input object comprises Fourier transforming the hologram of the input object.

23. (Currently amended) A storage medium encoded with a set of data created by:  
generating a hologram of a reference object;  
generating a hologram of an input object;  
defining a window within the hologram of the input object;  
correlating the hologram of the reference object with the window within the  
hologram of the input object to generate a set of correlation peaks;  
wherein the defining of a window within the hologram of the input object  
comprises defining a window according to the equation

$$H_p'(m, n; a_x, a_y) = H_p(m, n) \text{rect} \left( \frac{m - a_x}{b_x}, \frac{n - a_y}{b_y} \right),$$

wherein  $H_p'(m, n; a_x, a_y)$  is the defined window,  $\text{rect} \left( \frac{m - a_x}{b_x}, \frac{n - a_y}{b_y} \right)$  is

the rectangle function,  $H_p(m, n)$  is the hologram of the reference object,  $a_x$  is the  
location of the center of the window in the x direction,  $a_y$  is the location of the center  
of the window in the y direction,  $b_x$  is width of the window in the x direction,  $b_y$  is  
width of the window in the y direction.

24. (Original) The storage medium as set forth in Claim 23 further comprising analyzing the set of correlation peaks generated by the correlation of the hologram of the reference object with the hologram of the input object wherein the presence of a correlation peak indicates similarity between the reference object and the input object and wherein the lack of the presence of a correlation peak indicates dissimilarity between the reference object and the input object.

25. (Original) The storage medium as set forth in Claim 23 wherein the generating of the hologram of the reference object includes recording the hologram of the reference object.

26. (Original) The storage medium as set forth in Claim 23 wherein the generating of the hologram of the input object includes recording the hologram of the input object.

27. (Currently amended) A storage medium encoded with a set of data created by:  
generating a hologram of a reference object;  
generating a hologram of an input object;  
defining a window within the hologram of the input object;  
correlating the hologram of the reference object with the window within the  
hologram of the input object to generate a set of correlation peaks;

~~The storage medium as set forth in Claim 23~~ wherein the correlating of the hologram of the reference object with the window within the hologram of the input object comprises:

transforming the hologram of the reference object;  
transforming the window within the hologram of the input object; and  
multiplying the transformation of the hologram of the reference object by the transformation of the window within the hologram of the input object.

28. (Original) The storage medium as set forth in Claim 27 wherein the transforming of the hologram of the reference object comprises Fourier transforming the hologram of the reference object.

29. (Original) The storage medium as set forth in Claim 27 wherein the transforming of the window within the hologram of the input object comprises Fourier transforming the window within the hologram of the input object.

30. (Canceled)

31. (Original) The method as set forth in Claim 7 further comprising taking the absolute value of the transformation of the multiplication of the transformation of the hologram of the reference object by the transformation of the hologram of the input object.

32. (Original) The method as set forth in Claim 31 further comprising squaring the absolute value of the transformation of the multiplication of the transformation of the hologram of the reference object by the transformation of the hologram of the input object according to the equation

$$C_{OP}(x, y; a_x, a_y; a_x', a_y') = |F^{-1}\{F[H_O'(x, y; a_x, a_y)] \times F^*[H_P'(x, y; a_x', a_y')]\}|^2$$

wherein  $C_{OP}(x, y; a_x, a_y; a_x', a_y')$  is the intensity of the correlation of the hologram of the reference object with the hologram of the input object,  $H_O'(x, y; a_x, a_y)$  is the hologram of the reference object,  $H_P'(x, y; a_x', a_y')$  is the window defined within the hologram of the input object,  $F$  indicates a transformation,  $F^{-1}$  indicates an inverse transformation and  $F^*$  indicates a complex transformation.

33. (Original) The method as set forth in Claim 14 further comprising taking the absolute value of the transformation of the multiplication of the transformation of the hologram of the reference object by the transformation of the hologram of the input object.

34. (Original) The method as set forth in Claim 33 further comprising squaring the absolute value of the transformation of the multiplication of the transformation of the

hologram of the reference object by the transformation of the hologram of the input object according to the equation

$$C_{op}(x, y; a_x, a_y; a'_x, a'_y) = \left| F^{-1} \left\{ F[H_o'(x, y; a_x, a_y)] \times F^* [H_p'(x, y; a'_x, a'_y)] \right\} \right|^2$$

wherein  $C_{op}(x, y; a_x, a_y; a'_x, a'_y)$  is the intensity of the correlation of the hologram of the reference object with the hologram of the input object,  $H_o'(x, y; a_x, a_y)$  is the hologram of the reference object,  $H_p'(x, y; a'_x, a'_y)$  is the window defined within the hologram of the input object  $F$  indicates a transformation,  $F^{-1}$  indicates an inverse transformation and  $F^*$  indicates a complex transformation.

35. (Original) The method as set forth in Claim 32 wherein  $F$  indicates a Fourier transformation.

36. (Original) The method as set forth in Claim 34 wherein  $F$  indicates a Fourier transformation.

37. (Original) The method as set forth in Claim 3 wherein the recording of the hologram of the reference object includes digitally recording the hologram of the reference object.

38. (Original) The method as set forth in Claim 37 wherein the digitally recording of the hologram of the reference object comprises storing the hologram of the reference object in a computer readable storage medium.

39. (Original) The method as set forth in Claim 4 wherein the recording of the hologram of the input object includes digitally recording the hologram of the input object.



40. (Original) The method as set forth in Claim 39 wherein the digitally recording of the hologram of the input object comprises storing the hologram of the input object in a computer readable storage medium.

41. (Original) The method as set forth in Claim 10 wherein the recording of the hologram of the reference object includes digitally recording the hologram of the reference object.

42. (Original) The method as set forth in Claim 41 wherein the digitally recording of the hologram of the reference object includes storing the hologram of the reference object in a computer readable storage medium.

43. (Original) The method as set forth in Claim 11 wherein the recording of the hologram of the input object includes digitally recording the hologram of the input object.

44. (Original) The method as set forth in Claim 43 wherein the digitally recording of the hologram of the input object includes storing the hologram of the input object in a computer readable storage medium.

45. (Original) The method as set forth in Claim 15 further comprising applying a phase factor,  $\exp[i2\pi(a_x m + a_y n)]$ , to the window defined within the hologram of the input object.

46. (Currently amended) A method of determining a change in a kinematic property of an object, the method comprising:

- generating a first hologram of the object;
- generating a second hologram of the object; and
- correlating the first hologram with the second hologram, to generate a set of correlation peaks;

further comprising autocorrelating the first hologram and comparing the autocorrelation of the first hologram with the correlation of the first hologram with the second hologram.

47. (Original) The method as set forth in Claim 46 further comprising analyzing the set of correlation peaks wherein the presence of a correlation peak indicates a change in a kinematic property of the object and wherein the lack of the presence of a correlation peak indicates no change in the change in a kinematic property of the object.

48. (Canceled)

49. (Canceled)

50. (Canceled)

51. (Original) The method as set forth in Claim 1 wherein the reference object comprises an optical image, a digitized image, a one dimensional set of data, a two dimensional set of data, a multi-dimensional set of data, an electrical signal, an optical signal, a two-dimensional phase object, a multi-dimensional phase object or a color object.

52. (Original) The method as set forth in Claim 1 wherein the input object comprises an optical image, a digitized image, a one dimensional set of data, a two dimensional set of data, a multi-dimensional set of data, an electrical signal, an optical signal, a two-dimensional phase object, a multi-dimensional phase object or a color object.

53. (Original) The method as set forth in Claim 1 further comprising conveying the hologram of the reference object to a remote location over a distributed computer network.

54. (Original) The method as set forth in Claim 1 further comprising conveying the hologram of the input object to a remote location over a distributed computer network.

55. (Original) The method as set forth in Claim 1 further comprising conveying the correlation of the hologram of the reference object with the hologram of the input object to a remote location over a distributed computer network.

56. (Original) The method as set forth in Claim 8 further comprising conveying the hologram of the input object to a remote location over a distributed computer network.

57. (Original) The method as set forth in Claim 8 further comprising conveying the hologram of the reference object to a remote location over a distributed computer network.

58. (Original) The storage medium as set forth in Claim 8 further comprising conveying the correlation of the hologram of the reference object with the window defined within the hologram of the input object to a remote location over a distributed computer network.

59. (Original) The storage medium as set forth in Claim 23 further comprising conveying the hologram of the input object to a remote location over a distributed computer network.

60. (Original) The storage medium as set forth in Claim 23 further comprising conveying the hologram of the reference object to a remote location over a distributed computer network.

61. (Original) The storage medium as set forth in Claim 23 further comprising conveying the correlation of the hologram of the reference object with the

window within the hologram of the input object to a remote location over a distributed computer network.

62. (Original) The method as set forth in Claim 1 further comprising processing the hologram of the reference object by image compression of the hologram.

63. (Original) The method as set forth in Claim 62 further comprising conveying the compressed hologram to remote locations over a distributed computer network.

64. (Original) The method as set forth in Claim 1 further comprising processing the hologram of the input object by image compression of the hologram.

65. (Original) The method as set forth in Claim 64 further comprising conveying the compressed hologram to remote locations over a distributed computer network.

66. (Original) The method as set forth in Claim 62 further comprising processing the compressed hologram of the reference object by image decompression of the hologram.

67. (Original) The method as set forth in Claim 64 further comprising processing the compressed hologram of the input object by image decompression of the hologram.

68. (Canceled)

69. (Canceled)

70. (Canceled)

71. (Canceled)

72. (Canceled)

73. (Canceled)

74. (Original) The method as set forth in Claim 8 wherein the reference object comprises an optical image, a digitized image, a one dimensional set of data, a two dimensional set of data, a multi-dimensional set of data, an electrical signal, an optical signal, a two-dimensional phase object, a multi-dimensional phase object or a color object.

75. (Original) The method as set forth in Claim 8 wherein the input object comprises an optical image, a digitized image, a one dimensional set of data, a two dimensional set of data, a multi-dimensional set of data, an electrical signal, an optical signal, a two-dimensional phase object, a multi-dimensional phase object or a color object.

76. (Original) The method as set forth in Claim 46 wherein the reference object comprises an optical image, a digitized image, a one dimensional set of data, a two dimensional set of data, a multi-dimensional set of data, an electrical signal, an optical signal, a two-dimensional phase object, a multi-dimensional phase object or a color object.

77. (Original) The method as set forth in Claim 46 wherein the input object comprises an optical image, a digitized image, a one dimensional set of data, a two dimensional set of data, a multi-dimensional set of data, an electrical signal, an optical signal, a two-dimensional phase object, a multi-dimensional phase object or a color object.

78. (Canceled)

79. (Canceled)

80. (Canceled)

81. (Currently amended) A method of pattern recognition comprising:  
generating a hologram of a reference object;  
generating a hologram of an input object; and  
correlating the hologram of the reference object with the hologram of the input  
object to generate a set of correlation peaks;

~~The method as set forth in Claim 1~~ wherein correlating the hologram of  
the reference object with the hologram of the input object comprises:  
displaying the holograms of the input object and the reference object on  
electrically or optically addressable spatial light modulators;  
addressing the electrically or optically addressable spatial light  
modulators with a reference beam; and  
processing the holograms optically to generate a set of correlation  
peaks.

82. (Currently amended) A method of pattern recognition comprising:  
generating a hologram of a reference object;  
generating a hologram of an input object;  
defining a window within the hologram of the input object;  
correlating the hologram of the reference object with the window defined  
within the hologram of the input object to generate a set of correlation peaks;

~~The method as set forth in Claim 8~~ wherein correlating the hologram of the  
reference object with the window defined within the hologram of the input object  
comprises:

displaying the window defined within the hologram of the input object  
and the hologram of the reference object on electrically or optically addressable spatial  
light modulators;

addressing the electrically addressable spatial light modulator with a reference beam; and  
processing the holograms optically to generate a set of correlation peaks.

83. (Currently amended) A method of pattern recognition comprising:  
generating a hologram of a reference object;  
generating a hologram of an input object; and  
correlating the hologram of the reference object with the hologram of the input object to generate a set of correlation peaks;

~~The method as set forth in Claim 1~~ wherein correlating the hologram of the reference object with the hologram of the input object comprises:  
forming the holograms of the input object and the reference object on electrically or optically addressable spatial light modulators;  
addressing the optically addressable spatial light modulator with a reference beam; and  
processing the holograms optically to generate a set of correlation peaks.

84. (Currently amended) A method of pattern recognition comprising:  
generating a hologram of a reference object;  
generating a hologram of an input object;  
defining a window within the hologram of the input object;  
correlating the hologram of the reference object with the window defined within the hologram of the input object to generate a set of correlation peaks;

~~The method as set forth in Claim 8~~ wherein correlating the hologram of the reference object with the window defined within the hologram of the input object comprises:  
forming the window defined within the hologram of the input object and the hologram of the reference object on electrically or optically addressable spatial light modulators;

addressing the electrically or optically addressable spatial light  
modulators with a reference beam; and  
processing the holograms optically to generate a set of correlation peaks.